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PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Agenda ID # 12178
ENERGY DIVISION **RESOLUTION E-4595**
July 11, 2013

R E S O L U T I O N

Resolution E-4595. Southern California Edison Company seeks authorization to demonstrate the direct participation of a retail Customer's Vehicle-to-Grid ("V2G") Non-Generating Resource in the CAISO wholesale markets.

PROPOSED OUTCOME: This Resolution approves SCE's Schedule V2G Pilot tariff applicable to two retail Customer accounts of the Department of Defense for a period of one year, to be extended at the request of DoD.

SAFETY CONSIDERATIONS: Schedule V2G Pilot is between Southern California Edison Company and the Department of Defense. Based on the information before us, this tariff does not appear to result in any adverse safety impacts on the facilities or operations of SCE.

ESTIMATED COST: The $4.75 million V2G Pilot is funded by the California Energy Commission and U.S. Department of Defense. Non-participating SCE Customers will not be affected by the operational costs of the pilot.

By Advice Letter 2889-E Filed on April 23, 2013.

SUMMARY

Southern California Edison Company's ("SCE's") Schedule V2G Pilot tariff ("Tariff") applicable to the two Department of Defense Customer accounts ("DoD" or "Customer") receiving retail service at the Los Angeles Air Force Base ("LAAFB") and the Naval Air Weapons Station at China Lake ("NAWSCL") will advance the knowledge of demand response and electric vehicle-to-grid programs, and reduce transportation greenhouse gas emissions pursuant to targets set by B-16-2012. The V2G Tariff complies with the requirements of Decision ("D.") 10-12-036, in which the Commission encouraged the use of pilots to support the implementation of comprehensive demand response programs. SCE does not request any ratepayer funding to execute the pilot. SCE's request to proceed with the pilot is approved.

BACKGROUND

In several decisions, the Commission has indicated support for allowing bundled utility customers to participate in wholesale energy and ancillary services markets using new California Independent System Operator ("CAISO") products and tariffs that treat electric load as a supply side resource.

In 2010, Decision 10-06-002 ordered the Investor-Owned Utilities ("IOUs") to bid their demand response ("DR") programs into CAISO's market for Proxy Demand Response ("PDR") products, pending FERC approval of CAISO's program. The decision outlined the issues that must be addressed before implementation and did not allow participation by third party aggregators of IOU customers.[1] This Decision was followed by Decision 10-12-036, which formally allowed the IOUs to submit requests to the Commission to implement DR programs that would utilize the PDR products for demand response.[2]

In 2012, the Commission modified this policy to allow non-residential IOU customers to directly participate in the wholesale market.[3] Decision 12-11-025 set a broad policy objective for allowing bundled customers to participate in the wholesale market for demand response products. This Decision recognized that the Commission has some oversight over demand response aggregators that use the load of bundled IOU customers. The Decision ordered Energy Division and parties to the develop tariff language that will become each IOU's Electric Rule 24, which would establish the requirements for how this objective would be implemented and provided Commission staff with a timeline for implementation.[4]

While Rule 24 is being finalized, SCE requests permission to commence a pilot project that will allow DoD to use its plug-in electric vehicle ("PEV") fleets at LAAFB and NAWSCL to bid energy and ancillary services directly in CAISO wholesale markets. Per various mandates, the DoD is ordered to reduce fuel consumption and increase the use of plug-in electric vehicles to the extent that they are of comparable cost to conventional options.[5] As a part of this effort, DoD is implementing multi-phase V2G demonstration pilots at six DoD facilities across

[1] Decision on Phase Four Direct Participation Issues, D. 10-06-002, issued on June 4, 2010 in Rulemaking ("R.") 07-01-041.

[2] Decision Regarding Phase Four Direct Participation: Authorization for Investor-Owned Utilities to Participated in Bidding of the CAISO's Proxy Demand Resource Product, D. 10-12-036, issued on December 21, 2010 in R. 07-01-041.

[3] Decision Adopting Policies for Demand Response Direct Participation, D. 12-11-025 in R. 07-01-041 at p. 10.

[4] D. 12-11-025 in R. 07-01-041.

[5] Executive Order 13423 (January 24, 2007), Executive Order 13514 (October 5, 2009), and 10 USC Section 2922, subdivision (g).

the United States, with an overall goal of evaluating the impact of V2G in making PEVs a cost-effective alternative to conventional internal combustion engine vehicles.

The objective of the pilot is to develop and apply fleet management optimization software and electrical infrastructure needed to manage the DoD's PEV fleet. Pursuant to this objective, fleet managers will be able to schedule the charging and discharging of PEVs and participate in the CAISO energy and ancillary services markets. This fleet management capability will be designed to minimize cost, ensure consistent operation with other sources of load and generation on the base, and maintain energy security and reduce GHG emissions.[6]

The DoD contends that V2G is essential to its fleet electrification effort, which requires additional revenue to reduce the cost differential between EVs and conventional vehicles.[7] A DoD case study estimated the value of providing frequency regulation[8] in the CAISO market from a PEV sedan in Southern California to be $150/month/PEV.[9] A separate study suggested that maximum likely revenues from frequency regulation would provide approximately $100/month/PEV.[10]

In February 2012, DoD initiated a request that SCE permit it to demonstrate vehicle-to-grid technologies and participate in the CAISO markets. In response, SCE submitted for Commission approval the proposed Schedule V2G tariff that permits the two DoD bases to directly participate in the CAISO markets and is designed to establish roles for SCE to accommodate their participation.

To execute the proposed pilot, SCE requests approval of a new tariff, the SCE Vehicle to Grid Experimental Pilot, or Schedule V2G Pilot ("V2G Pilot"), which will

[6] Optimal Scheduling of Air Force Demonstration Plug-In Electric Vehicles EW-201243. http://www.serdp.org/Program-Areas/Energy-and-Water/Energy/Microgrids-and-Storage/EW-201243#top

[7] Gorguinpour, Cameron. "The DOD V2G Pilot Project." DoD Plug-In Electric Vehicle Program. http://electricvehicle.ieee.org/files/2013/03/DoD-Plug-In-Electric-Vehicle-Program.pdf

[8] "Regulation" is defined at http://www.caiso.com/Pages/glossary.aspx. It is "used to control the Power output of electric generators in a prescribed area in response to a change in system frequency, tie line loading, or the relation of these to each other as to maintain the target system frequency and/or the established interchange with other Balancing Authority Areas within the predetermined Regulation Limits." In the case of the V2G Pilot, the bases' PEV fleets will be CAISO-certified System Resources capable of responding to AGC signals in an upward and downward direction to match, in Real-Time, Demand and resource.

[9] Gorguinpour, p. 7. Assumes a 15 kW bidirectional power capacity, driven 12,000 miles/year, operating 9-5pm. Values based on 2011 regulation compensation in SP-26.

[10] Marnay, Chris, et al., *Los Angeles Air Force Base Vehicle to Grid Project*, ECEEE 2013 Summer Study, June 3, 2013, p. 11.

govern the relationship between SCE and the Customer. SCE does not request any new ratepayer funding to perform the pilot program.

The V2G Pilot is organized under the Department of Defense's Strategic Environmental Research and Development Program ("SERDP") and Environmental Security Technology Certification Program ("ESTCP"), which are executed in partnership with the Department of Energy and Environmental Protection Agency. SERDP and ESTCP manage investments in science and technology to improve environmental performance, reduce costs, and enhance and sustain mission capabilities.[11]

NOTICE

Notice of AL 2889-E was published in the Commission's Daily Calendar. Southern California Edison states that a copy of the Advice Letter and Substitute Sheet 3 to Schedule V2G Pilot were mailed and distributed in accordance with General Rule 3.14 of the Commission's General Order 96-B. SCE asserts that it distributed AL 2889-E and its substitute sheet to the service list of R.07-01-041, regarding policies and protocols for demand response load impact estimates, cost-effectiveness methodologies, megawatt goals, and alignment with CAISO market design protocols.

PROTESTS/COMMENTS

Advice Letter 2889-E was not protested. Energy Division received timely responses from the California Independent System Operator ("CAISO") and the Department of Defense's Office of the Undersecretary of Defense on May 9, 2013.

The CAISO supports SCE's proposed pilot program. The CAISO confirms the statements in the AL that SCE will be the PEV resources' Scheduling Coordinator and that the resources will use the CAISO's Non-Generator Resource ("NGR") model. The CAISO states that the pilot is "a significant step in the development of vehicle-to-grid projects" and strongly encourages the Commission to approve the AL.[12]

The CAISO strongly encourages the Commission to approve the pilot to advance the development of vehicle-to-grid projects.

The CAISO notes that it conferred with SCE on concerns with Special Condition 8 of the original proposed tariff, which prohibited the Customer's "dual

[11] Information about SERDP and ESTCP is available at http://www.serdp.org/About-SERDP-and-ESTCP

[12] Response of the California Independent System Operator to SCE's AL 2889-E (May 9, 2012), p. 1.

participation" in multiple demand response programs. In response to this concern, SCE removed the condition, pursuant to decisions in R.07-01-041.[13] SCE filed Substitute Sheet 52579-E* to reflect this correction on May 9, 2013.

In response to the CAISO's concern about the original AL's proposed prohibition on dual participation, SCE removed the condition in question pursuant to decisions in R.07-01-041.

The Department of Defense ("DoD") supports the approval of the AL. Pursuant to its goal to accelerate PEV adoption within the military's non-tactical vehicle fleet, the DoD believes that V2G is a means to "reduce fleet expenses while enhancing mission capabilities." LAAFB and NAWSCL are notable federal facilities in regard to vehicle electrification. LAAFB is the first to complete an entire fleet replacement with PEVs and NAWSCL will have the largest federal fleet of PEVs. DoD asserts that the pilot will have meaningful impacts on the PEV industry and consumer adoption of V2G, meet actions ordered by the Governor's ZEV Action Plan, and benefit electric grid reliability. DoD requests a decision to ensure that the pilot launches in a timely manner and that CPUC work with DoD, CAISO, and SCE to identify pathways to continue the program beyond the year-long pilot and potential six-month extension identified in the AL.[14]

DoD supports the Advice Letter and asserts that the pilot will mark a major milestone in the development of vehicle-to-grid and plug-in electric vehicle technologies.

DISCUSSION

On April 23, 2013, SCE filed Advice Letter ("AL") 2889-E requesting Commission approval of changes to its tariffs to include Schedule V2G Pilot. On May 9, 2013, SCE filed a Substitute Sheet Number 52579-E*, which replaced Sheet 3 of Schedule V2G Pilot and removed Special Condition 8.

Specifically, SCE requests that the Commission expeditiously issue a final resolution that contains:

1. approval of Schedule V2G Pilot, which will govern the relationship between SCE and the Customer's two accounts for the duration of the pilot;
2. permission that the Customer's two accounts may proceed with the V2G Pilot in order for interested parties to benefit from improved

[13] SCE states that D.10-06-002, D.10-12-060, and D.12-11-025 address dual participation, and thus obviate the need to specifically reference it within Schedule V2G Pilot.

[14] Response of the Office of the Under Secretary of Defense to SCE's AL 2889-E (May 9, 2012), p. 1.

knowledge regarding (1) the utility role in and costs of direct participation, (2) solutions for retail Customers that seek to participate in CAISO's ancillary services markets and the related settlement processes, (3) a proof of concept demonstrating the viability of vehicle-to-grid;

3. a statement of the V2G Pilot's non-precedential status.

Energy Division evaluated Schedule V2G Pilot based on the following criteria:

- Consistency with D.10-12-036, which authorized the Investor Owned Utilities to participate in the bidding of the CAISO's Proxy Demand Resource Product, including:
  - development of new demand response resources to reduce greenhouse gas emissions,
  - furthering the goals of renewable resource integration,
  - use of pilots to improve knowledge and insight on demand response program implementation.
- Consistency with the Zero-Emission Vehicles Action Plan
- Cost Reasonableness
- Public Safety
- Project Viability

Consistency with D.10-12-036:

The development of new demand response resources to reduce greenhouse gas emissions.

This pilot project is consistent with the Commission's objectives for demand response programs as determined by D.10-06-004 and D.10-12-036. Decision 10-06-004 explained how the benefits of demand response aligned with the broader economic and environmental objectives that the Commission seeks to achieve. Demand response avoids greenhouse gas emissions by avoiding the need to use fossil fuel plants during hours of peak demand, when the least-efficient plants are typically dispatched. Demand response could also help incorporate renewable generation into the grid, supporting a significant driver of GHG emission reductions in the state.

Furthering the goals of renewable resource integration.

In Decision 10-12-036, the Commission found that demand response resources are likely to prove valuable to assure the reliability of California's electricity supply and assist in the incorporation of renewable resources in to the grid.[15] More recently, the Commission's Rulemaking 10-12-007 on Energy Storage pursuant to AB 2514 has preliminarily found that storage resources may potentially be cost effective in selected applications, including the provision of distribution storage near substations.[16] Benefits may include deferring distribution upgrade costs, reducing reliability costs resulting from load growth and increasing penetrations of photovoltaic generation resources.

The use of pilots to improve knowledge and insight on demand response program implementation.

Pilot projects can help the Commission and interested parties better understand the potential benefits of new technologies and identify unforeseen barriers to implementation. In D.10-12-036, parties argued that pilots would be the best opportunity to evaluate the "challenges and impacts" of new DR products to gauge their long term value. The Commission supported the development of PDR pilots to help resolve questions about demand response prior to the consideration of whether and how to implement more comprehensive PDR programs.[17] The topics of such questions include: (1) long-term procurement value, (2) Resource Adequacy counting conventions, (3) baseline calculations, (4) communications needs arising from the increased use of DR resources, (5) the need for consumer protection mechanisms.

Consistent with D.10-12-036, the V2G Pilot will improve understanding of both behind-the-meter demand response and storage from plug-in electric vehicles.

The V2G Pilot entails a retail energy customer bidding in their demand response capabilities through SCE as their Scheduling Coordinator directly into the CAISO's markets. As outlined in the Advice Letter, SCE describes six objectives:

1. Studying the role of the utility, if any, in direct participation by retail end-use Customers;
2. Determining the utility costs involved in facilitating the proper maintenance of direct participation and metering data analysis;

[15] D.10-12-036 at p. 6.

[16] http://www.cpuc.ca.gov/PUC/energy/electric/storage.htm

[17] D.10-12-036 in R.07-01-041 at p. 5-6 and 7.

3. Supporting a pioneering Customer in the direct participation space, with all its technical and metering novelties;
4. Developing potential solutions that may be scalable (possibly with modifications) to other retail Customers wishing to participate in CAISO's ancillary services markets;
5. Completing a "proof of concept" test demonstrating the technical viability of V2G; and
6. Increasing understanding of the settlement process for wholesale market participation on behalf of a retail Customer.

In response to a Commission data response, SCE proposed a process for tracking pilot activities, assessing results, and formulating conclusions and recommendations pursuant to the objectives above. The Commission directs SCE to collaborate with the Energy Division, Department of Defense and its contractors, the CAISO, and other pilot participants to compile a report that outlines the results and conclusions of the V2G Pilot. We provide additional (underlined) process steps and clarifications to assist the Commission in leveraging the lessons from the V2G Pilot:

1) Collecting quantitative pilot activity data:
   a) Reg up, reg down, and non-performance events
   b) Double-benefit events
   c) Timing, other issues with major pilot processes
2) Collecting pilot financial data:
   a) DoD regulation revenues
   b) SCE costs
   c) "Double-Benefit" and true-up costs
3) Qualitative evaluations:
   a) Key implementation process assessment
      - Include timeline of major events related to: base infrastructure design and permitting; interconnection studies; equipment testing; execution of agreements (Wholesale Distribution Access Tariff, Participating Load and Participating Generator Agreements, Schedule V2G Pilot); operations launch
   b) Lessons learned
      - Including technical, business operations, legal, and regulatory issues
      - Customer experience and satisfaction
4) Assessing quantitative and qualitative data

a) Revenue and cost to DoD and SCE
   - Estimation of degradation impact on PEV battery life
   - Electrical infrastructure and equipment costs

b) Cost effectiveness
   - Net effect on PEV operational costs, in comparison to charging/discharging PEVs on otherwise applicable tariff
   - Net effect on facility retail electric costs

c) Qualitative assessment
   - Implications for CPUC proceedings and/or CAISO market initiatives, for example: Alternative Fuel Vehicles, Demand Response, Distributed Generation, Energy Storage, Non-Generator Resource Model, Pay for Performance, Metering and Telemetry
   - Customer experience and satisfaction

5) Recommendations
   a) Program expandability
      - Elements for future tariffs or programs
   b) Enhancement of opportunities for vehicle electrification and direct participation

The information reported as a result of the V2G Pilot can serve as a basis for the Commission's policymaking in demand response, alternative fueled vehicles, energy storage, and other proceedings. To this end, SCE shall serve the report to the Commission via the Service Lists for R.07-01-041, R. 09-08-009, R.10-12-007 and other relevant proceedings ("Relevant Service Lists") no later than eighteen months after the Start of the Pilot, the date on which each military base first participates in the CAISO markets as a NGR.

SCE shall collaborate with the Energy Division, Department of Defense, and the CAISO, to file a report with the Commission that details its findings and conclusions from the V2G Pilot no later than eighteen months after the Start of the Pilot.[18]

In the interest of educating parties and Commission staff, we also ask that SCE submit an interim report on the implementation requirements, listed above in reporting requirement number three. We expect that these issues will largely be understood by the time the pilot officially begins. Therefore we ask that SCE submit this report to the Relevant Service Lists no later than six months after the Start of the Pilot.

[18] The start of the pilot is measured from the day that DoD begins delivering ancillary services from its vehicle fleet.

SCE shall collaborate with the Energy Division, Department of Defense, and the CAISO to file a report with the Commission that details its findings and conclusions related to the implementation of the V2G Pilot no later than six months after the Start of the Pilot.

SCE notes that the pilot aims to obtain knowledge and experience on direct participation, its costs, and to develop potential ways to modify the direct participation structure in the future. As a result, SCE requests that the Commission include a statement of the Pilot's non-precedential status that includes that "…[N]othing in the pilot be construed as a waiver of SCE's ability to support different policy positions in the future."[19] SCE provides examples of potential issues including:

- SCE 's provision of Scheduling Coordinator services to a retail customer,
- The utility activities and costs in facilitating direct participation,
- The use of a CAISO revenue grade meter, rather than an SCE retail billing meter, to effectively "submeter" a customer's resource,
- The potential that a customer resource would require a Service Extension per Electric Rule 16, and
- The overall cost-benefit of direct participation.

SCE is permitted to maintain different policy positions on Vehicle to Grid other than those findings within the Reports that will be filed with the Commission as directed herein.

In its proposal, SCE asked that the pilot be authorized to continue for one year. Given the uncertainty surrounding the pilot launch date at the second site (NAWSCL), the tariff states that the pilot be allowed to continue for an additional six months at the mutual consent of SCE and the DoD. Because the second pilot site is expected to begin V2G implementation several months after the first site (LAAFB), SCE agreed to offer an extension to the pilot of up to six months. SCE views the maximum 18-month pilot period as an extension of the planned 12-month test rather than as a "limitation." The proposed extension to 18 months for the pilot intends to avoid the implication that Schedule V2G Pilot is either a permanent tariff or a special arrangement just for SCE's DoD Customers. In its response to the Commission, DoD asked the Commission to work together with parties enable a smooth transition to continue the pilot after the timeframe identified in the Advice Letter.

[19] AL 2889-E, Section V, at p. 6.

One year is the period typically used for such a pilot program, because it allows stakeholders to test program processes, staffing, technology, and outcomes for an entire annual billing cycle. However, as DoD has invested significant time and resources in this pilot, the Commission finds that it is important to make sure that DoD can successfully continue implementing this project after the first year. To avoid the potential disruption or delays in this transition, the Commission requests that DoD be afforded the option to continue the pilot with amendments to the current tariff after the conclusion of the first 12-month study. This option can be exercised exclusively by DoD.

The Commission does not currently have rules in place that would enable DoD to easily continue this project with a third party Scheduling Coordinator ("SC"). A second phase of this project that evaluates the experience of a third party Scheduling Coordinator for a behind-the-meter resource may provide valuable data and information to the Commission. To avoid potential delays in the case that Electric Rule 24 is not ready for implementation by the end of the proposed pilot program, SCE is requested to submit an alternative tariff sheet that allows for continuing the pilot under a third party Scheduling Coordinator.

To enable the Commission and DoD to evaluate this alternative V2G Pilot tariff, SCE will submit the tariff to the Commission as a Tier 2 Advice Letter and DoD nine months after the Start of the Pilot. The Commission instructs SCE to provide two options to the customer:

1. Use a third party SC in lieu of Southern California Edison. If or when the option to use a third party SC to participate in the CAISO markets is available, the Customer should consider using a third party SC to do so.

2. Maintain Southern California Edison as the SC.

Regardless of which option DoD chooses, SCE should allow DoD to continue on this tariff until Rule 24 is fully implemented.

At the same time, SCE should also revise, if necessary, the existing Schedule V2G Pilot tariff to reflect any changes in costs for the pilot. This report should reflect any findings from the initial months of the pilot's operations. The DoD will then use this information to determine how it would like to proceed with the project.

Nine months after the Start of the Pilot, SCE will submit to the Commission via a Tier 2 Advice Letter and DoD a tariff that allows for DoD to continue accessing the CAISO markets through a third party Scheduling Coordinator or through Southern California Edison as Scheduling Coordinator.

Table 1: Filing Schedule of V2G Pilot Reports

To be served to the Relevant Service Lists	Due no later than (time) after the Start of the Pilot
Implementation Report	6 months
Initial Operations and Transition Report	9 months
Findings and Conclusions Report	18 months

Consistency with the Zero-Emission Vehicles Action Plan

Executive Order B-16-2012 set forth targets for the commercialization of zero-emission vehicles ("ZEV") to reduce emissions from the transportation sector by 80% by 2050. The ZEV Action Plan identifies specific strategies and actions that the state agencies will take to meet the milestones of B-16-2012. The Action Plan sets four broad goals to advance ZEVs, which include:

(1) Complete needed infrastructure and planning,

(2) Expand consumer awareness and demand,

(3) Transform fleets, and

(4) Grow jobs and investment in the private sector.

The under the second goal, the Action Plan identifies the CPUC as the lead agency to implement certain activities related to vehicle-to-grid. Specifically, the Action Plan requires the CPUC to:

- pilot infrastructure systems that avoid or minimize demand impacts on the grid from PEV charging through energy storage, demand response, distributed generation, or other mechanisms;
- demonstrate vehicle-to-grid and smart charging capabilities for medium-duty and heavy-duty fleets.[20]

The V2G Pilot will demonstrate how the battery storage of two fleets of plug-in electric light duty vehicles may provide energy and ancillary services to the

[20] Office of Governor Edmund G. Brown, *2013 ZEV Action Plan: A Roadmap toward 1.5 Million Zero-emission Vehicles on California Roadways by 2025*, p. 13.

CAISO markets. The DoD plans on deploying V2G-capable medium duty trucks during future phases of the overall pilot (which are not the subject of the instant Advice Letter). The CAISO's Non-Generating Resource model allows eligible Demand Response and Limited Energy Storage Resources to participate in markets including regulation up, regulation down, spinning reserve, and non-spinning reserve.

The optimization software that will be used to control the bases' PEV charging and discharging is designed to minimize cost. Consistent with the Action Plan requirement in generating bids for submission to CAISO, the optimization will consider the vehicle charging requirements and their effects on the bases' peak demands. Please refer to the *Structure of Technology and Processes Employed in V2G Pilot* section for a description of how the V2G Pilot will optimize and execute charging according to signals from the CAISO markets.

The remainder of the Customer's facilities will continue to be billed on their otherwise applicable tariff, net of any credits or debits from participation and SCE service fees. LAAFB was previously enrolled on SCE's Schedule Net Energy Metering (NEM) to accommodate onsite generation from photovoltaics. Since Schedule NEM treats storage as a Non-NEM eligible generating technology,[21] the Customer decided against continuing under Schedule NEM. Nevertheless, this pilot will assist the Commission in understanding how mitigate the negative effects of PEV charging on the Customer premise and the electricity system more broadly. Pursuant to the Action Plan, future pilots should ensure that customers who seek to implement V2G are able to maintain their enrollment in other utility tariffs or programs.

The objectives of the V2G Pilot are consistent with the directives of, and will advance the implementation of the ZEV Action Plan as ordered by B-16-2012.

Cost Reasonableness

The pilot is funded in three parts. The DoD funded $2 million for the vehicle fleet, charging, and other physical facilities at the bases. The ESTCP funded $1.75 million to a team led by Lawrence Berkeley National Laboratory ("LBNL") to provide fleet management, communications, and optimization software needed to participate in the CAISO markets.[22] The California Energy Commission funded $1 million from the Alternative and Renewable Fuel and

[21] See SCE Schedule NEM, Special Condition 5.b.

[22] Lawrence Berkeley National Laboratory, October 1, 2012, http://der.lbl.gov/sites/der.lbl.gov/files/LAAFB_PEV_V2G_demo_description_20121001.pdf

Vehicle Technology Program for vehicles and to support integration with the base's facilities.[23]

The V2G Pilot has received $4.75 million in State and Federal funding.

SCE AL 2889-E does not request ratepayer funds to design and administer the pilot. The DoD is responsible for service fees from manual billing and Scheduling Coordinator services. SCE proposes to bill the Customer these fees as a credit entry to the distribution sub-account of the Base Revenue Requirement Balancing Account ("BRRBA"). The fees will be returned to SCE customers on an annual basis when the December 31 balance is included in rate levels for the following year. BRRBA is subject to review in the Energy Resource Recovery Account proceeding and will accrue monthly interest.

The DoD will be responsible for all costs of the pilot, which will have no effect on the rates of non-participating Customers.

The Customer is responsible for all operational costs associated with SCE's provision of services related to the V2G pilot, which will not affect other SCE customers' rates.

SCE will manually apply credits or debits from the Customer's participation in the CAISO markets to the Customer's retail electric bill. The Customer will be responsible for SCE's costs necessary in completing this task including: (1) setting up the Customers' accounts; (2) reconciling the effect of instructions to reduce load or discharge PEV batteries on the Customer's retail electricity load to prevent dual compensation; (3) adjusting the base's retail bills to account for credits or debits from each resource's invoices from wholesale market participation; and (4) transferring data between SCE business units responsible for Scheduling Coordination and billing. Detailed costs are included in Table 2 below.

Table 2: DoD Customer Costs Incurred by SCE during V2G Pilot

MONTHLY LABOR COST PER CUSTOMER			
Activity, Description	**One-Time Cost**	**Monthly Cost**	**Annual Cost**
Account Setup, changes to rate and account to enable V2G Pilot participation.	$ 53.36	$ -	$ 53.36
Double Benefit Usage Adjustment, reconciles changes in load resulting from			

[23] California Energy Commission, May 10, 2012,

http://www.energy.ca.gov/releases/2012_releases/2012-05-10_advance_green_transportation_awards_nr.html

CAISO regulation up instructions at the master meter to account for their effects of on retail demand and energy use.		$ 49.32	
Line Item Adjustment, manual application of CAISO debit /credit and SCE service fees to Customer's monthly retail bill (inclusive of tracking, reporting, and true-up activities).	$ -	$ 183.15	$2,197.80
TOTAL ANNUAL LABOR COST			*$2,843.00*
TOTAL MONTHLY LABOR COST (ANNUAL COST / 12)			*$ 236.92*
MONTHLY LABOR COST PER CUSTOMER (MONTHLY COST / 2)			**$ 118.46**

MONTHLY DATA FEED COST PER CUSTOMER			
Activity	**One-Time Cost**	**Monthly Cost**	**Annual Cost**
Data Feed, transfer of data from SCE Wholesale Energy Market Trading Group to SCE Billing Group	$ -	$433.00	$5,196.00
TOTAL ANNUAL DATA FEED COST			*$5,196.00*
TOTAL MONTHLY DATA FEED COST (ANNUAL COST / 12)			*$ 433.00*
MONTHLY DATA FEED COST PER CUSTOMER (MONTHLY COST / 2)			**$ 216.50**

While the bases both have multiple vehicles, each base will be treated as a single resource, with a unique Resource ID. We find this approach to be appropriate for this pilot, though we note that CAISO rules would allow this resource to be aggregated under a single CAISO Resource ID in the CAISO market.

The costs above represent a 'non-automated' solution to address the billing needs of this pilot. In the future, we expect that the utility will develop automated billing and data collection solutions that can simplify this process and minimize costs.

Provision 3 of the Rates section of Schedule V2G Pilot does not allow the customer to reduce load or discharge PEV batteries in response to a CAISO signal to count against the retail energy or demand charge calculation. Instead, the tariff proposes using the 'gross' facility demand total to determine the base's usage during peak load incidents.[24] Although the Commission has reservations about this "Double Benefit Usage Adjustment," this provision is retained in the

[24] The Commission interprets the Double Benefit Usage Adjustment described in Rates Provision 3 to add back into the master metered load both energy (kWh) and demand (kW) provided in response to a CAISO signal that coincides with the facility's "peak load." This

approved Advice Letter. Adding the changes to PEV load "back into the load registered on the master meter" so that their associated energy and demand count toward the total demand charges may be inconsistent with the fundamental purpose of demand charges and may discourage customers from participating in load control programs. As a proxy for fixed charges to recover infrastructure costs, demand charges are intended to assess higher costs on customers with higher instantaneous loads that create higher infrastructure costs for the utility. The Commission is not convinced that load reductions should be added back to the total demand charge simply because they result from services bid into CAISO markets. However, exploring this issue is beyond the scope of this Advice Letter. We will revisit this issue when SCE files its revised tariffs for the second year of the program. SCE is asked to report data on the impact of this provision as part of its report due in month nine.

The accounting of energy and demand per Rates Provision 3 may be inconsistent with the intent of demand charges and may discourage customers from participating in load control programs. The Commission will revisit this issue when SCE submits its revised tariffs for the second year of the project. SCE is required to report data on the impact of this provision as part of its report due in month nine.

Public Safety

California Public Utilities Code Section 451 requires that every public utility maintain adequate, efficient, just, and reasonable service, instrumentalities, equipment and facilities to ensure the safety, health, and comfort of the public.

Schedule V2G Pilot is between Southern California Edison Company and the Department of Defense. Based on the information before us, this tariff does not appear to result in any adverse safety impacts on the facilities or operations of SCE.

All SCE rules apply to Schedule V2G Pilot, including Rule 2, which describes electrical service and requires the customer to ensure safe interface with the SCE system; Rule 21, which specifies interconnection rules designed to ensure safe operation of interconnected generators with the intent to protect public safety; and the Wholesale Distribution Access Tariff. DoD was required to sign an interconnection agreement to specify the SCE rules that apply to their operations. All facilities must comply with SCE's Electric Service Requirements. Work completed by SCE for any project is completed according to the safe work practices in the SCE Accident Prevention Manual.

adjustment will occur only for "peak load shaving," i.e. energy and demand foregone during the 15-minute maximum monthly peak.

As with any generator, DoD received approval from SCE electrical engineers on the design and operation of its facilities. Prior to the launch of the pilot, SCE will complete testing of the plug-in electric vehicles and electric vehicle service equipment, which are capable of providing bi-directional power for purposes of the pilot.

SCE has completed inspections of the facility design and vehicle and electrical infrastructure equipment that will be used in the V2G Pilot and has concluded that they will be operated according to SCE rules and safety practices.

Project Viability

The DoD has invested substantial effort within California and across the United States for this and similar pilots. The effort will evaluate the revenue potential for V2G across DoD installations and will compare regulations and policies that permit the use of vehicles as grid resources across various utility territories and Independent System Operator control areas. Other V2G installations include Joint Base Andrews, Maryland; Fort Hood Army Base, Texas; Marine Corps Base Kanehoe Bay, Hawaii; and Joint Base McGuire-Dix-Lakehurst, New Jersey.

For the LAAFB and NAWSCL facilities subject to Schedule V2G Pilot, the DoD has installed electrical infrastructure to accommodate charging stations, metering and telemetry equipment, and procured vehicles to enable V2G. At LAAFB, 35 of the 41 PEVs will be V2G capable for approximately 600 kW of instantaneous demand or capacity. At China Lake, 75 PEVs will be V2G capable for approximately 3,000 kW of instantaneous demand or capacity.

Structure of Technology and Processes Employed in V2G Pilot

At each base, the PEVs will receive electricity service behind one point of interconnection to SCE's distribution system. The Customer will use a CAISO revenue-grade meter to distinguish PEV demand and energy from the remainder of the base, which remains on an otherwise applicable tariff.

The V2G Pilot will employ an integrated system of fleet management, vehicle charging optimization, and information exchange systems to implement scheduling, bidding, and vehicle charging (collectively known as "PEV-fleetOPT"). This system, which is conceptually displayed in Figure 1, consists of:[25]

> Bosch eMobility Solution ("eMobility"): A fleet management system for base dispatchers that also controls vehicle charging. eMobility communicates to the charging stations to start or stop charging and discharging, manages schedules, and organizes trip itineraries. Since the

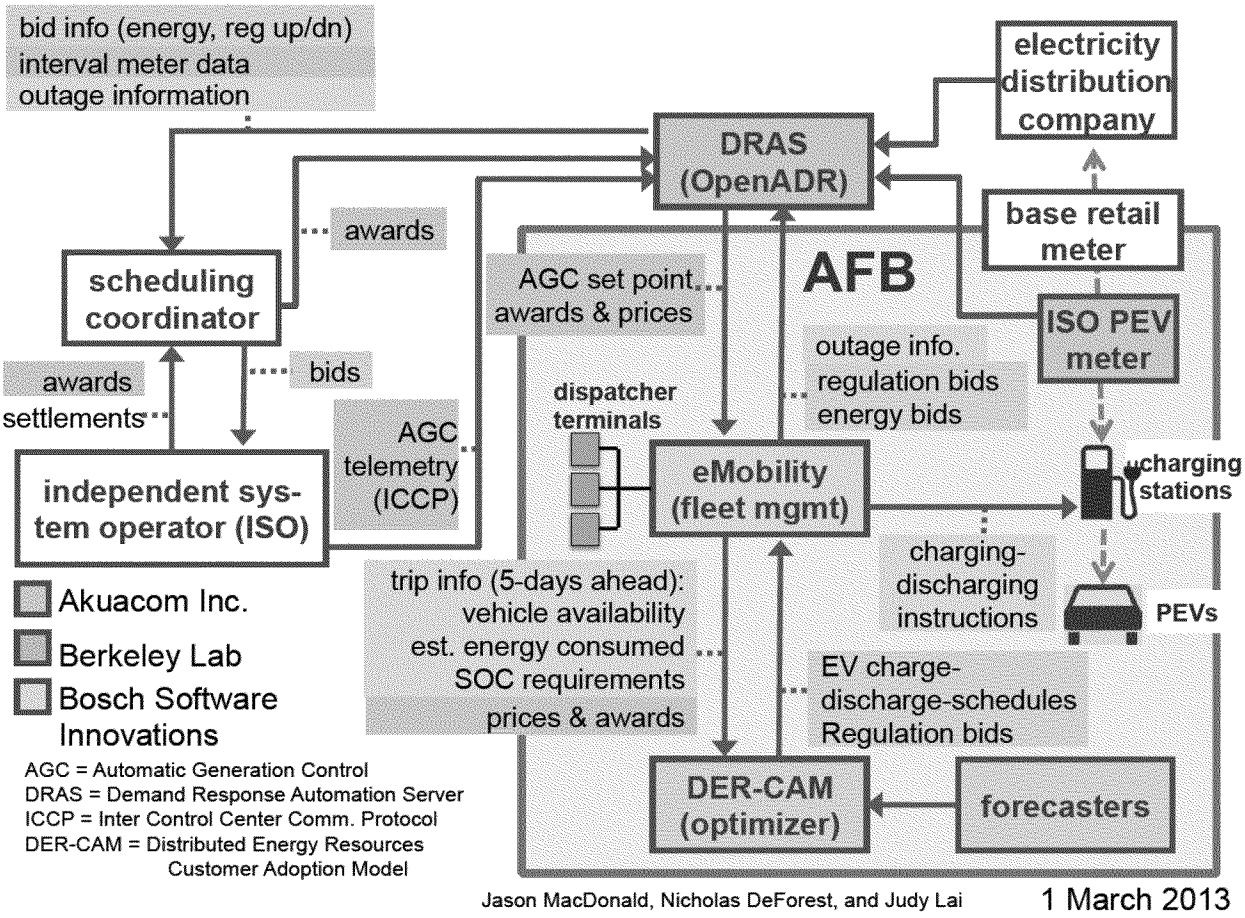
[25] Marnay et al, p. 11.

CAISO regulation signal is sent every 4 seconds, it receives instructions continuously.

LBNL Distributed Energy Resources Consumer Adoption Model ("DER-CAM"): An optimization capability to schedule fleet and ancillary service bids, based on inputs such as available battery capacity, charge or discharge capabilities, forecasts, and weather data. EMobility will request and implement DER-CAM's schedules as they are awarded by CAISO.

Akuacom Demand Response Automation Server ("DRAS"): A data exchange functionality that relays instructions from the CAISO energy and ancillary services markets using the Open Automated Demand Response (OpenADR) communications protocol. The DRAS transmits bids for optimal scheduling from DER-CAM to the Scheduling Coordinator and awarded schedules from the CAISO to eMobility.[26]

Figure 1: Bid, charging instruction, and electricity flows in PEV-fleetOPT.



[26] Marnay et al, p. 3 and 5-7.

SCE serves as both the Customer's Load Serving Entity and Scheduling Coordinator ("SC"). To account for the payments associated with the PEV resources' provisions of ancillary services, SCE will use a specific SC Identification (ID) for each of the two bases. Each base's PEV fleet is assigned a unique Resource ID. As the SC, SCE will receive day-ahead or hour-ahead bids for submission to CAISO. The PEV resource will be participating as a Non-Generating Resource within the CAISO market.[27] For awarded bids, the CAISO will dispatch Automatic Generator Control ("AGC") instructions via the DRAS for implementation by eMobility.

The CAISO financially settles the provision of the ancillary service according to three components: (1) energy consumed or generated by the PEVs at the Locational Marginal Price; (2) capacity payments; and (3) for frequency regulation, a performance payment for the accuracy of the resources response to the regulation signal. The Customer's monthly retail bills will be adjusted according to the settlement payments from the applicable periods and items outlined in Table 2.

The V2G Pilot is supported by significant market research, and technological and infrastructural development. The V2G Pilot has received funding to support its operations; therefore the Commission finds that the V2G Pilot is viable.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review and comment prior to a vote of the Commission. Section 311(g)(2) provides that this 30-day period may be reduced or waived upon the stipulation of all parties in the proceeding.

The 30-day comment period for the draft of this resolution was neither waived nor reduced. Accordingly, this draft resolution was mailed to parties for comments, and will be placed on the Commission's agenda no earlier than 30 days from today.

FINDINGS AND CONCLUSIONS

1. Southern California Edison Company ("SCE") filed Advice Letter ("AL") 2889-E on April 23, 2013, in which it requested Commission authorization to demonstrate the direct participation of a retail customer's Vehicle-to-Grid

[27] CAISO Market Design Initiatives Update, (January 14, 2013).
http://www.cpuc.ca.gov/NR/rdonlyres/542129F8-74DE-4DDF-ABD2-1A706E7A30E0/0/CAISO_Storage.pptx

("V2G") Non-Generating Resource in the CAISO wholesale markets and approval for an accompanying tariff, Schedule V2G Pilot. AL 2889-E received two timely responses from the Department of Defense ("DoD") and the California Independent System Operator on May 9, 2013.

2. The CAISO strongly encourages the Commission to approve the pilot to advance the development of vehicle-to-grid projects.
3. In response to the CAISO's concern about the original AL's proposed prohibition on dual participation, SCE removed Special Condition 8 pursuant to decisions in R.07-01-041.
4. DoD supports the Advice Letter and asserts that the pilot will mark a major milestone in the development of vehicle-to-grid and plug-in electric vehicle technologies.
5. Consistent with D.10-12-036, the V2G Pilot will improve understanding of both behind-the-meter demand response and storage from plug-in electric vehicles.
6. The objectives of the V2G Pilot are consistent with the directives of, and will advance the implementation of the ZEV Action Plan as ordered by Federal Executive Order B-16-2012.
7. The V2G Pilot has received $4.75 million in State and Federal funding.
8. The Customer is responsible for all operational costs associated with SCE's provision of services related to the V2G pilot, which will not affect other SCE customers' rates.
9. The accounting of energy and demand per Rates Provision 3 may be inconsistent with the intent of demand charges and may discourage customers from participating in load control programs. The Commission will revisit this issue when SCE submits its revised tariffs for the second year of the project.
10. SCE has completed inspections of the facility design and vehicle and electrical infrastructure equipment that will be used in the V2G Pilot and has concluded that they will be operated according to SCE rules and safety practices.
11. The V2G Pilot is supported by significant market research, and technological and infrastructural development. The V2G Pilot has received funding to support its operations; therefore the Commission finds that the V2G Pilot is viable.

THEREFORE IT IS ORDERED THAT:

1. Southern California Edison's Schedule V2G Pilot is approved.
2. The Customer's two retail accounts are permitted to proceed with the V2G Pilot.
3. SCE is directed to file no later than six months after the Start of the Pilot a report on their findings related to the implementation of the V2G Pilot.
4. SCE is directed to file no later than nine months after the Start of the Pilot a tariff that allows the Customer to continue to access the CAISO markets as a Tier 2 Advice Letter and a report on the initial operations and costs to the customer related to Rates Provision 3.
5. SCE is directed to file no later than 18 months after the Start of the Pilot a report on their findings and results in collaboration with the Department of Defense and its contractors, and the CAISO.
6. The approval of the V2G Pilot does not set precedent for SCE's potential policy positions regarding direct participation or vehicle-to-grid.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on July 11, 2013; the following Commissioners voting favorably thereon:

_____
Paul Clanon
Executive Director